# Background

Take notes here:

# Mini-debate activity

## Format

1AC—assumed

CX of 1AC—2 minutes

1NC—assumed

CX of 1NC—2 minutes

2AC—4 minutes

CX of 2AC—2 minutes

2NC—8 minutes

CX of 2NC—3 minutes

1AR—3.5 minutes

2NR—4 minutes

2AR—4 minutes

Everyone will receive 35 minutes of combined break and prep time. You should prepare to debate both sides of the activity, including pre-flowing the 1AC and 1NC. You can use any pertinent evidence from the Space Cooperation affirmative and negative files from the ORS lab. Students will be selected to be the 1A, 2A, and 2N.

## 1AC

### 1AC – Plan

#### Plan: The United States Federal Government should increase its diplomatic engagement with the People's Republic of China by offering a joint space exploration program, including removing the Wolf Amendment and increasing Mars colonization efforts.

### 1AC – Colonization Advantage

#### Contention 1 is exploration:

#### Every second we don’t colonize another planet ends 1029 future human lives – outweighs any other impact

Bostrom 3— Nick Bostrom, Nick Bostrom is a Swedish philosopher at the University of Oxford known for his work on existential risk, the anthropic principle, human enhancement ethics, superintelligence risks, the reversal test, and consequentialism. ("Astronomical Waste: The Opportunity Cost of Delayed Technological Development", Utilitas, 2003, Available Online at http://www.nickbostrom.com/astronomical/waste.html, accessed 7-15-2016, JSO)

As I write these words, suns are illuminating and heating empty rooms, unused energy is being flushed down black holes, and our great common endowment of negentropy is being irreversibly degraded into entropy on a cosmic scale. These are resources that an advanced civilization could have used to create value-structures, such as sentient beings living worthwhile lives.

The rate of this loss boggles the mind. One recent paper speculates, using loose theoretical considerations based on the rate of increase of entropy, that the loss of potential human lives in our own galactic supercluster is at least ~10^46 per century of delayed colonization.[1] This estimate assumes that all the lost entropy could have been used for productive purposes, although no currently known technological mechanisms are even remotely capable of doing that. Since the estimate is meant to be a lower bound, this radically unconservative assumption is undesirable.

We can, however, get a lower bound more straightforwardly by simply counting the number or stars in our galactic supercluster and multiplying this number with the amount of computing power that the resources of each star could be used to generate using technologies for whose feasibility a strong case has already been made. We can then divide this total with the estimated amount of computing power needed to simulate one human life.

As a rough approximation, let us say the Virgo Supercluster contains 10^13 stars. One estimate of the computing power extractable from a star and with an associated planet-sized computational structure, using advanced molecular nanotechnology[2], is 10^42 operations per second.[3] A typical estimate of the human brain’s processing power is roughly 10^17 operations per second or less.[4] Not much more seems to be needed to simulate the relevant parts of the environment in sufficient detail to enable the simulated minds to have experiences indistinguishable from typical current human experiences.[5] Given these estimates, it follows that the potential for approximately 10^38 human lives is lost every century that colonization of our local supercluster is delayed; or equivalently, about 10^29 potential human lives per second.

While this estimate is conservative in that it assumes only computational mechanisms whose implementation has been at least outlined in the literature, it is useful to have an even more conservative estimate that does not assume a non-biological instantiation of the potential persons. Suppose that about 10^10 biological humans could be sustained around an average star. Then the Virgo Supercluster could contain 10^23 biological humans. This corresponds to a loss of potential equal to about 10^14 potential human lives per second of delayed colonization.

What matters for present purposes is not the exact numbers but the fact that they are huge. Even with the most conservative estimate, assuming a biological implementation of all persons, the potential for one hundred trillion potential human beings is lost for every second of postponement of colonization of our supercluster.[6]

#### Mars colonization is possible – resources and power generation

Zubrin 11 — Robert Zubrin, Robert Zubrin is President of Pioneer Astronautics, an aerospace R&D company located in Lakewood, Colorado. He is also the founder and President of the Mars Society, an international organization dedicated to furthering the exploration and settlement of Mars by both public and private means. Formerly a Staff Engineer at Lockheed Martin Astronautics in Denver, he holds a Masters degree in Aeronautics and Astronautics and a Ph.D. in Nuclear Engineering from the University of Washington. ("Victory From Mars", Toward a Theory of Spacepower: Selected Essays, 3-7-2011, Available Online at https://books.google.com/books?id=fF8Lql4ZTqYC, accessed 7-15-2016, JSO)

Among extraterrestrial bodies in our solar system, Mars is singular in that it possesses all the raw materials required to support not only life, but also a new branch of human civilization. This uniqueness is illustrated most clearly if Mars is contrasted with the Earth's Moon, the most frequently cited alternative location for extraterrestrial human colonization.

Unlike the Moon, Mars is rich in carbon, nitrogen, hydrogen, and oxygen, all in biologically readily accessible forms such as carbon dioxide gas, nitrogen gas, water ice, and permafrost.2 Carbon, nitrogen, and hydrogen are only present on the Moon in parts per million quantities. Oxygen is abundant on the Moon, but only in tightly bound oxides such as silicon dioxide, ferrous oxide, magnesium oxide, and alumina oxide, which require very high-energy processes to reduce.' Current knowledge indicates that if Mars were smooth and all its ice and permafrost melted into liquid water, the entire planet would be covered with an ocean over 200 meters deep.' This scenario contrasts strongly with the Moon, which is so dry that if concrete were found there, lunar colonists would mine it to get the water out. Thus, if plants could be grown in greenhouses on the Moon (an unlikely proposition, as the Moon's 2-week-long dark spell is unsuitable for most plants, and the absence of any atmosphere would make necessary very thick glass for solar flare shielding), most of their biomass material would have to be imported.

The Moon is also deficient in about half the metals of interest to industrial society (copper, for example), as well as many other elements of interest such as sulfur and phosphorus. Mars has every required element in abundance. Moreover, on Mars, as on Earth, hydrologic and volcanic processes have occurred that are likely to have consolidated various elements into local concentrations of high-grade mineral ore. Indeed, the geologic history of Mars has been compared to that of Africa, with very optimistic inferences as to its mineral wealth implied as a corollary.' In contrast, the Moon has almost no history of water or volcanic action, with the result that it is basically composed of trash rocks with little differentiation into ores that represent useful concentrations of anything interesting.

Power could be generated on either the Moon or Mars with solar panels, and here the advantages of the Moon's clearer skies and closer proximity to the Sun than Mars roughly balance the disadvantage of large energy storage requirements created by the Moon's 28-day light/dark cycle. But if the desire was to manufacture solar panels so as to create a self-expanding power base, Mars holds an enormous advantage, as only Mars possesses the large supplies of carbon and hydrogen needed to produce the pure silicon required for making photovoltaic panels and other electronics. Also, there is no geologically purified source of silicon dioxide, such as sand, on the Moon. In addition, Mars has the potential for wind-generated power, while the Moon clearly does not. But both the Sun and wind offer relatively modest power potential—tens or at most hundreds of kilowatts here or there. To create a vibrant civilization, a richer power base is needed, and Mars has this both in the short and medium term in the form of its geothermal power resources, which offer the potential for large numbers of locally created electricity-generating stations in the 10 megawatt (10,000 kilowatt) class. In the long term, Mars will enjoy a power-rich economy based upon exploitation of its large domestic resources of deuterium fuel for fusion reactors. Deuterium is five times more common on Mars than it is on Earth, and tens of thousands of times more common on Mars than on the Moon.'

But the biggest problem with the Moon, as with all other airless planetary bodies and proposed artificial free-space colonies, is that sunlight is not available in a form useful for growing crops. A single acre of plants on Earth requires 4 megawatts (MW) of sunlight power; a square kilometer needs 1,000 MW. The entire world put together would not produce enough electric power to illuminate the farms of the state of Rhode Island. Growing crops with electrically generated light is economically hopeless. But natural sunlight cannot be used on the Moon or any other airless body in space unless the walls on the greenhouse are thick enough to shield out solar flares, a requirement that enormously increases the expense of creating crop land. Even accomplishing this requirement would do no good on the Moon, because plants will not grow in a light/dark cycle lasting 28 days.

But Mars has an atmosphere thick enough to protect crops grown on the surface from solar flares. Therefore, thin-walled inflatable plastic greenhouses protected by unpressurized ultraviolet-resistant hard-plastic shield domes can be used to rapidly create crop land on the surface. Even without the problems of solar flares and a month-long diurnal cycle, such simple greenhouses would be impractical on the Moon as they would create unbearably high temperatures. On Mars, in contrast, the strong greenhouse effect created by such domes would be precisely what is necessary to produce a temperate climate inside. Such domes up to 50 meters in diameter are light enough to be transported from Earth initially, and they eventually could be manufactured on Mars out of indigenous materials. Because all the resources to make plastics exist on Mars, networks of such 50- to 100-meter domes could be manufactured and deployed rapidly, opening up large areas of the surface to both shirtsleeve human habitation and agriculture. Looking further into the future, it will eventually be possible for humans to thicken Mars' atmosphere substantially by forcing the regolith to outgas its contents through a deliberate program of artificially induced global warming. Once that has been accomplished, the habitation domes could be almost any size, as they would not have to sustain a pressure differential between their interior and exterior. In fact, once that has been done, it will be possible to raise specially bred crops outside the domes.

The point is that unlike colonists on any other known extraterrestrial body, Martian colonists will be able to live on the surface, not in tunnels, and move about freely and grow crops in the light of day. Mars is a place where humans can live and multiply to large numbers, supporting themselves with products of every description made out of indigenous materials. Mars is thus a place where an actual civilization, not just a mining or scientific outpost, can be developed. And it is this civilization, grown in size and technological potency on a frontier planet with a surface area as large as all the continents of Earth put together, that will both radically tip the balance among those who remain behind on Earth and provide the pioneers with the craft and outlook required to push the human reach much further.

Thus, for our generation and those soon to follow, Mars is the new world. The nation that settles it is one whose culture, values, social forms, and ideas will provide the point of departure for the further development of human civilization as our species expands outward from its planet of origin to the innumerable others awaiting us in the infinite reaches of space.

#### Humans will be able to survive—terraforming creates access to frozen water, we can alter the soil to grow food, and spacesuits help avoid radiation poisoning

Williams 14 (Matt, is a frequent author for the website universetoday.com. http://www.universetoday.com/111462/how-can-we-live-on-mars/#//MTB)

In order to survive the lack of air pressure and the cold, humans will need pressurized and heated habitats. Martians, the terrestrial kind, will also need a spacesuit whenever they go outside. Every hour they spend outside will add to their radiation exposure, not to mention all the complications that exposure to radiation brings. For the long term, we’ll need to figure out how to extract water from underground supplies, and use that to generate breathable air and rocket fuel. And once we’ve reduced the risk of suffocation or dying of dehydration, we’ll need to consider food sources, as we’ll be outside the delivery area of everyone except Planet Express. Care packages could be shipped up from Earth, but that’s going to come with a hefty price tag. We’ll need to produce our own food too, since we can’t possible hope to ship it all in on a regular basis. Interestingly, although toxic, Martian soil can be used to grow plants once you supplement it and remove some of the harsher chemicals. NASA’s extensive experience in hydroponics will help. To thrive on Mars, the brave adventurers may want to change themselves, or possibly their offspring. This could lead to genetic engineering to help future generations adapt to the low gravity, higher radiation and lower air pressure. And why stop at humans? Human colonists could also adapt their plants and animals to live there as well. Finally, to take things to the next level, humanity could make a few planetary renovations. Basically, we could change Mars itself through the process of terraforming. To do this, we’ll need to release megatons of greenhouse gasses to warm the planet, unleashing the frozen water reserves.

#### International cooperation is key to exploration and China will say yes

China Daily 4-25 (Chinese national newspaper, "China open to Sino-US space cooperation", China Daily, 4/25/2016, http://usa.chinadaily.com.cn/china/2016-04/25/content\_24814214.htm)

BEIJING -- China is open to space cooperation with all nations including the United States, the heavyweights of China's space program said on Sunday, the anniversary of China's first satellite launch 46 years ago.¶ "China will not rule out cooperating with any country, and that includes the United States," said Yang Liwei, China's first astronaut.¶ Payload has been reserved in the Chinese space station, due to enter service around 2022, for international projects and foreign astronauts, said Yang on the occasion of the first China Space Day, an annual celebration newly designated by the government.¶ Upon request, China will also train astronauts for other countries, and jointly train astronauts with the European space station, Yang said.¶ "The future of space exploration lies in international cooperation. It's true for us, and for the United States too," according to the senior astronaut.¶ His words were echoed by Zhou Jianping, chief engineer of China's manned space program. Zhou said, "It is well understood that the United States is a global leader in space technology. But China is no less ambitious in contributing to human development."¶ "Cooperation between major space players will be conducive to the development of all mankind," Zhou added.¶ Citing security reasons, the U.S. Congress passed a law in 2011 to prohibit NASA from hosting Chinese visitors at its facilities and working with researchers affiliated to any Chinese government entity or enterprise.¶ The ban remains in effect.¶ The U.S.-dominated International Space Station, which unsurprisingly blocks China, is scheduled to end its service in 2024. China's space station could be the only operational one in outer space, at least for a while.¶ Commenting on Sino-U.S. space relations earlier this week, Xu Dazhe, the head of China's National Space Administration, cites Hollywood sci-fi blockbuster "The Martian," in which a U.S. astronaut gets stranded on Mars and is eventually brought back to Earth by NASA, with help from China.¶ Xu Dazhe noted that China and the United States established a special dialogue mechanism last year and talks would continue this year.¶ For chief engineer Zhou, the movie simply reflects what most people want. "Many American astronauts and scientists that I have met said they would like to work with us, if given the freedom of choice."¶ The China Space Day was designated to mark the launch of China's first satellite on April 24, 1970.

#### China is crucial – other international cooperation already exists but Chinese capabilities offer the missing piece of the puzzle

NRC 14 (other authors: Aeronautics and Space Engineering Board; Space Studies Board; Division on Engineering and Physical Sciences; Committee on National Statistics; Division of Behavioral and Social Sciences and Education; Committee on Human Spaceflight; "Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space Exploration", http://www.nap.edu/catalog/18801/pathways-to-exploration-rationales-and-approaches-for-a-us-program)

International collaboration has become an integral part of the space policy of essentially all nations that participate in space activities around the world. Most countries now rarely initiate and carry out substantial space projects without some foreign participation. The reasons for collaboration are multiple, but countries, including the United States, cooperate principally when they benefit from it.¶ It is evident that near-term U.S. goals for human exploration are not aligned with those of our traditional international partners. Although most major spacefaring nations and agencies are looking toward the Moon, specifically the lunar surface, U.S. plans are focused on redirection of an asteroid into a retrograde lunar orbit where astronauts would conduct operations with it. It is also evident that given the rapid development of China’s capabilities in space, it is in the best interests of the United States to be open to its inclusion in future international partnerships. In particular, current federal law that prevents NASA from participating in bilateral activities with the Chinese serves only to hinder U.S. ability to bring China into its sphere of international partnerships and substantially reduces the potential international capability that might be pooled to reach Mars. Also, given the scale of the endeavor of a mission to Mars, contributions by international partners would have to be of unprecedented magnitude to defray a significant portion of the cost. This assessment follows from the detailed discussion in Chapter 4 of what is required for human missions to Mars.

#### Even if cooperation with other countries *could* be good, bans on US-China cooperation causes a focus on copycat research that collapses the budget and stunts innovation to get to space – the plan enables a new generation of tech to get to Mars

Dickerson 15 “Here's why NASA won't work with China to explore space” Kelly Dickerson - science reporter at Tech Insider, covering space and physics. graduated from the CUNY Graduate School of Journalism with an M.A. in science and health reporting. B.S. degree in biology and a B.A. degree in communication from Berry College. previously written for Live Science, Space.com, and Psychology Today, Oct. 19, 2015, http://www.techinsider.io/nasa-china-collaboration-illegal-2015-10

NASA could have much to gain in the future in working with China. China became the third country ever to successfully launch humans into space, behind Russia and the US, and it's made much progress since. Two years ago, CNSA landed a small telescope on the moon, which is still up there taking crystal-clear images of the cosmos (because Earth's dirty atmosphere isn't in the way). The agency also operates its own space lab called Tiangong 1, is testing powerful new rockets, and has ambitious plans to land more probes on the moon and perhaps a colony there one day. If CNSA's progress in space exploration and tech development isn't a compelling enough reason to work with China, then NASA's stunted budget offers another. More international collaboration could only be positive for a space agency that has faced budget cut after budget cut. President John F. Kennedy committed to a moon landing by the end of the 1960s, then Nixon took the helm and slammed on the brakes after a handful of crewed lunar missions. As Logsdon writes in an article for NASA: "Nixon rejected NASA's ambitious post-Apollo plans, which included developing a series of large space stations, continued missions to the moon, and an initial mission to Mars in the 1980s," Logsdon writes. "By the time Nixon left the White House, the NASA budget had fallen from its peak of almost 4% of the total federal budget to less than 1%." Some argue that we would already have sent humans to Mars if NASA had kept its momentum. More collaboration could help get NASA back on track. NASA administrator Charles Bolden event wrote in a recent blog post that he thinks more collaboration will help get us get boots on Mars: A Journey such as this is something that no one person, crew, or Agency can undertake alone. [...] A mission of this magnitude is made stronger with international partnership – the sort of spirit and cooperation that is demonstrated so vividly by the tens of thousands of people across 15 countries who have been involved in the development and operation of the International Space Station. In fact, NASA just announced a partnership with the Israel Space Agency that will allow the two agencies to conduct joint missions and share research facilities. I personally think it would be great to see a similar agreement with China some day soon — especially since the nation announced it's seeking international partners to help build another space station in the 2020s (and the station sounds really cool). But again, current US law forbids NASA from helping out or getting involved at all. Russia will only support the $100 billion space station until 2024, and that's a huge problem because, right now, NASA relies on Russia's rockets to get its astronauts into space. It's unclear what NASA will do once Russia pulls out. Working with China and other nations to build a bigger and better space station would be a great option. Instead of two space stations, we could have one truly international station with the most brilliant scientists around the world working together. That kind of collaboration would speed up tech development; instead of space stations just copying each other's rockets and space probes, we could start working together to advance technology at a much faster pace than we are right now. We'll need a new generation of space tech if we ever hope to get to Mars. It already seems like the two agencies do want to collaborate, since discussion of that possibility has reached the White House several times. US scientists have also openly criticized policy makers in the past for preventing Chinese scientists from attending space conferences. It seems like politics shouldn't get in the way of pure scientific pursuit, but the reality is US lawmakers won't allow collaboration with China because they are worried about national security and protecting state secrets. But who knows, if the two space agencies started working together, it might open up enough lines of communication between the US and China for the two nations to defrost their icy relationship. In the meantime China will continue to expand its space exploration efforts. Unless a big policy shift happens, NASA might have to sit on the sidelines while an incredible new chapter of space exploration begins.

#### Other countries say no or are insufficient – Chinese cooperation causes international follow on

Tiezzi 14 (June 5, 2014; Shannon Tiezzi is Editor at The Diplomat. Her main focus is on China, and she writes on China’s foreign relations, domestic politics, and economy. Shannon previously served as a research associate at the U.S.-China Policy Foundation, where she hosted the weekly television show China Forum; “Report: To Reach Mars, NASA Must Work With China”; <http://thediplomat.com/2014/06/report-to-reach-mars-nasa-must-work-with-china/> )

The U.S. space program should seek to expand its cooperation with China, a new report has found. The report by the National Research Council, titled “Pathways to Exploration – Rationales and Approaches for a U.S. Program of Human Space Exploration,” laid out recommendations for the future of U.S. space agency NASA. Congress ordered the report in 2010; the results of the four-year investigation were released Wednesday. NASA is banned from cooperating with China on projects under a 2011 appropriations law that states: None of the funds made available by this Act may be used for the National Aeronautics and Space Administration (NASA) or the Office of Science and Technology Policy (OSTP) to develop, design, plan, promulgate, implement, or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company unless such activities are specifically authorized by a law enacted after the date of enactment of this Act. The ban reflects congressional unease about high-tech cooperation with China in any field. There are also restrictions limiting the extent of mil-to-mil cooperation with China as well as a ban on certain high-tech exports. Frank Wolf, the Representative behind the anti-China clause, explained his reasoning. “We don’t want to give them the opportunity to take advantage of our technology, and we have nothing to gain from dealing with them,” he said back in 2011. He also cited moral concerns over working with the Chinese government: “Would you have a bilateral program with Stalin?” Scientists, however, have been far less supportive of the ban. Last October, when it came to light that Chinese scientists had been banned from attending a NASA conference, the news sparked outrage and boycotts among American scientists. Geoff Marcy, a U.S. scientist considered to have been on the short-list for the 2013 Nobel Prize in physics, called the ban “completely shameful and unethical.” NASA eventually backtracked and re-invited the Chinese scientists, in part after Rep. Wolf said that NASA was not prohibited by law from interacting with individual Chinese citizens. Though Wolf argued the law had been misinterpreted, he stood firm behind the blanket ban on cooperation between NASA and Chinese government entities. However, the backlash over the conference drew new attention to the ban, with many speaking out against it. Since then, there have been signs NASA is seeking a change. And such a change may be possible: with Rep. Wolf announcing he will not seek reelection this year, the ban on NASA-China cooperation will lose its strongest supporter. In January, officials from China’s National Space Administration were included in an international meeting hosted by the U.S. State Department. Because funding was provided by State, not NASA, it did not violate the 2011 law. The meeting was a rare opportunity for U.S. and Chinese officials to talk about potential space cooperation. Still, NASA Administrator Charles Bolden cautioned against too much optimism: “Human spaceflight is not something that’s going to happen with [the] U.S. [and] China in the foreseeable future, because we are forbidden from doing that by law,” he reminded reporters. Now, the NRC’s report officially calls for a reexamination of the 2011 ban. “This policy, while driven by congressional sentiment, denies the U.S. partnership with a nation that will probably be capable of making truly significant contributions to international collaborative missions,” the report said. “Given the rapid development of China’s capabilities in space, it is in the best interests of the United States to be open to its inclusion in future international partnerships,” it continued. The report also recommended that NASA turn its focus to sending a manned mission to Mars, calling the red planet “the horizon goal for human space exploration.” Yet the NRC cautioned that this goal could not be reached without more extensive international cooperation. “We’re really talking about international collaboration of a different scale than what has been conducted in the past,” Jonathan Lunine, co-chair of the NRC panel, told reporters. Even while the NRC highlighted the need for international efforts, Russia is drastically scaling back its space cooperation with the U.S. in response to Western sanctions stemming from the Ukraine crisis. Russia has announced that it will withdraw from the International Space Station in 2020, and will cease selling the RD-180 engine that currently powers the U.S. Atlas 5 rocket. With Russia withdrawing (at least temporarily) from space cooperation with the U.S., cooperation with China becomes all the more vital. “Current federal law preventing NASA from participating in bilateral activities with the Chinese … reduces substantially the potential international capability that might be pooled to reach Mars,” the report found.

### 1AC – Multilateralism Advantage

#### Contention 2 is Multilateralism:

#### The Wolf Amendment stalls international cooperation in space—prevents any bilateral cooperation with China

Kohler 15 (Hannah Kohler, Research Assistant, Edward Bennett Williams Law Library at Georgetown University Law Center, March 2015, “The Eagle and the Hare: U.S.–Chinese Relations, the Wolf Amendment, and the Future of International Cooperation in Space,” [http://georgetownlawjournal.org/files/2015/04/Kohler-TheEagleandtheHare.pdf //](http://georgetownlawjournal.org/files/2015/04/Kohler-TheEagleandtheHare.pdf%20//) MH)

Although the 2011–2013 Wolf Amendments severely constricted NASA’s ability to interact with other spacefaring nations (there are so few, after all), at the very least their application evinced careful consideration of a policy balance between national security, morality, international cooperation, and practicality. That may have changed in 2014. Public Law 113-76, the Consolidated Appropriations Act 2014 (2014 Appropriations Act), was signed by the President in January 2014 113 and contained a slight deviation from the core text of its three predecessors—a change so seemingly insignificant that it might not seem worth the effort to mention it. However, the potential repercussions are staggering. The relevant text in Sections 532(a), (c), and (d) is identical to Sections 535(a), (c) and (d) in the 2013 Appropriations Act. 114 However, the newly amended Section 532(b) states that “ [n]one of the funds made available by this Act may be used to effectuate the hosting of official Chinese visitors at facilities belonging to or utilized by NASA.” 115 Considering that the annual appropriations act dictates the spending of NASA’s entire governmental budget, this change appears to categorically bar official Chinese visitors from NASA facilities (or even facilities “used” by NASA!) where any government-granted money is involved, whether the forum is a bilateral one or not. This could reasonably be read to exclude Chinese citizens from all multinational conventions or events with NASA, unless the events could be certified by the House Appropriations Committee as posing no national- or economic-security risk; that is, the 2014 Appropriations Act could conceivably be enacting the very restrictions that Congressman Wolf protested so vehemently in the wake of the 2013 Ames Conference debacle.

#### Absent a change in law, a space race is inevitable

Weeden and He 4/26 (Brian Weeden, Technical Advisor for Secure World Foundation, and Xiao He, Assistant Research Fellow at the Institute of World Economics and Politics in the Chinese Academy of Social Sciences, 4/26/16, “Use Outer Space to Strengthen U.S.-China Ties,” <http://warontherocks.com/2016/04/use-outer-space-to-strengthen-u-s-china-ties/> // MH)

The United States and China have identified space as a strategic domain that is critical to their national interests and development. Both nations are dedicating considerable resources to developing their civil, military, and commercial space sectors. Beijing and Washington see their space accomplishments as important to boosting national pride and international prestige. Over time, what happens in space could serve as either a source of instability, or a means of strengthening the U.S.-China relationship. The United States and China have differing goals and priorities in space. The United States is focused on assuring continued access to space and sees it as a critical domain to its security and prosperity. Space-based capabilities and services provide the foundation for U.S. national security, enabling communications with U.S. strategic forces, allowing the verification and monitoring of arms control treaties, forming the cornerstone of the United States’ intelligence, surveillance, and reconnaissance (ISR) capabilities, and serving as essential enablers for the United States’ ability to defend its borders, project power to protect its allies and interests overseas, and defeat adversaries. Space capabilities are also a critical piece of the U.S. — and the global — economy. China is focused on developing its own capabilities in the space domain, and increasingly depends on space-based assets for both economic and military aims that may be partly incompatible, and even in competition, with other key players, especially the United States. China sees space as critical to defending its national security and securing its role as a rising power. From China’s perspective, the most urgent problem is that the space capability gap between the United States and China is growing. China also seeks a voice in the creation of international norms and institutions — particularly because it perceives that it must accept rules that have been decided mainly by the United States. As the two nations act on these differing priorities and goals, tensions in the space domain have had ramifications for the overall bilateral relationship. Recent testing and development of anti-satellite capabilities by China, and a doctrinal focus on “active defense” have caused the United States to openly call for a stronger focus on space protection and warfighting. From the Chinese perspective, it is necessary to develop such capabilities to support national security, close the power gap, and defend itself from American aggression., Failure to reconcile their differences in this domain could lead to a renewed arms race that could be to the detriment of both sides. Both countries have acknowledged the importance of developing a more stable, cooperative, and long-lasting bilateral relationship in space. Washington still hopes that Beijing can be a constructive partner for greater international space security. While China still chafes at the largely American constructed rules-based order, it likewise has a clear interest in using its development of space capabilities to promote bilateral cooperation and to play a role the formation of new international regimes. Both of these dynamics were evident in recent United Nations discussions on space governance, with an isolated Russia attempting to undermine international consensus on new guidelines for enhancing the long-term sustainability of space activities. Thus, the two sides have overlapping interests that present opportunities for cooperation and bilateral engagement. Accordingly, the United States and China should continue to engage in both bilateral and multilateral initiatives that enhance the long-term sustainability and security of space. Working together, and with other stakeholders, to help ensure the success of these initiatives would go a long way toward reinforcing the desire of both countries to be seen as playing leading roles in space governance and being responsible space powers. The United States and China, as well as the private sectors of the two countries, should also find a way to engage in bilateral and multilateral civil space projects, including science and human exploration, though doing so will need to overcome strong political challenges.

#### No tech sharing DA – cooperation is mutually beneficial and builds trust

Listner and Johnson-Freese 14 (Michael, is a an attorney and the founder and principal of Space Law & Policy Solutions, a legal and policy think tank that identifies issues and offers practical solutions on matters related to outer space security, national security and outer space development, and Joan is a professor of national security affairs at the Naval War College in Newport, Rhode Island. //MTB)

The National Research Council (NRC) recently released a report on the future of U.S. human spaceflight. Besides advocating a Mars mission the report also advocated pursuing more international collaboration, specifically to include China. That would require a distinct change in U.S. policy. There will likely be resistance to that recommendation from the small but powerful congressional enclave behind the legislatively imposed restrictions on U.S-Sino cooperation since 2011. But the realist approach advocated by the NRC report has a much better chance of serving U.S. security interests than the current ineffectual policy that attempts to isolate and “punish” China for domestic policies. President Barack Obama met with then-Chinese President Hu Jintao in January 2011. Part of their joint statement addressed the desire for deepened dialogue and interaction in space, which many people interpreted as a new willingness on the part of the United States to work with China, perhaps leading to a cooperative program. U.S.-Sino relations had basically been moribund since the sensationalist 1999 Cox Committee report alleging theft of information on American thermonuclear weapons and transfer of sensitive missile technology by profit-hungry American aerospace companies. Though nonpoliticized analysis from experts at institutions such as Stanford University largely discredited the report, congressional caterwauling successfully pushed the United States into the impossible position of trying to isolate Chinese space activities in a globalized world, and ended up primarily hurting U.S. aerospace companies through the draconian export control measures issued consequent to the Cox Committee report. But cooperation was not to be. In April 2011, Rep. Frank Wolf (R-Va.), chairman of the House Appropriations subcommittee overseeing NASA and a long-time China hardliner, especially regarding freedom of religion issues, inserted two sentences into funding legislation that prohibits any joint scientific activity between the United States and China that involves NASA or is coordinated by the White House Office of Science and Technology Policy (OSTP). That legislation has endured. NASA and OSTP remain banned from bilateral activity with China. Though Wolf is retiring in January 2015, speculation regarding potential successors includes individuals with views similar to his. Wolf’s rationale for banning bilateral U.S.-China relations, given in a 2011 interview, includes three key points. “We don’t want to give them the opportunity to take advantage of our technology, and we have nothing to gain from dealing with them,” Wolf said. “And frankly, it boils down to a moral issue. … Would you have a bilateral program with Stalin?” The three assumptions in that statement are, quite simply, wrong, and counterproductive to U.S. interests. First, it assumes that working with the United States would give China opportunities not otherwise available and implies that the United States would be doing China a favor. Though China has wanted to participate on the international space station program and was banned from doing so by the United States, it will have its own space station soon. In fact, when China’s space station becomes operational around 2022, it could quickly become the de facto international space station, given that the ISS is currently funded only through 2024, and that China has already invited other countries to visit its facility. In terms of the U.S. doing China a favor, Chinese politicians are still interested in the ISS for symbolic reasons, specifically, being accepted as part of the international family of spacefaring nations. But many Chinese space professionals fear that cooperation with the United States would just slow them down. American politicians are viewed as fickle and without the political will to see programs to completion, a view not exclusive to China. Further, other countries, including U.S. allies, regularly work with and sell aerospace technology to China. China has not been isolated. Second, Wolf’s rationale assumes the United States has nothing to gain by working with the Chinese. On the contrary, the United States could learn about how they work — their decision-making processes, institutional policies and standard operating procedures. This is valuable information in accurately deciphering the intended use of dual-use space technology, long a weakness and so a vulnerability in U.S. analysis. Working together on an actual project where people confront and solve problems together, perhaps beginning with a space science or space debris project where both parties can contribute something of value, builds trust on both sides, trust that is currently severely lacking. It also allows each side to understand the other’s cultural proclivities, reasoning and institutional constraints with minimal risk of technology sharing. From a practical perspective, working with China could diversify U.S. options for reaching the ISS. The need for diversification has become painfully apparent consequent to Vladimir Putin’s expansionist actions in Ukraine resulting in U.S. sanctions. Russian Deputy Prime Minister Dmitry Rogozin subsequently stated, “I propose that the United States delivers its astronauts to the ISS with the help of a trampoline.” And finally, Wolf stated that the United States should not work with China based on moral grounds. While clearly the United States would prefer not to work with authoritarian regimes, it has done so in war and in peacetime when it has served American interests. That is the basis of realism: Serve American interests first. While the United States would prefer not to work with Stalin, we continue to work with Putin when it benefits us to do so. Were the U.S. not to work with authoritarian regimes, it would have few to work with at all in the Middle East. We live in a globalized world. Attempting to isolate Chinese space activities has proved futile, and in fact pushed China and other countries into developing indigenous space industries — totally beyond any U.S. control — that they might have done otherwise. High fences around areas of technology where the United States has a monopoly — and there are few of those left — combined with a realist approach to working with China when and were we can, will allow the U.S. to lead rather futilely playing whack-a-mole, trying to beat back anticipated Chinese space achievements.

#### That ban creates a space rivalry – cooperation leads to a space code of conduct that solves war and space debris

Zhao 14 (Zhao Weibin, Research Fellow for the Center on China-America Defense Relations (CCADR) at the PLA Academy of Military Science (AMS), 7/9/14, “Sino-US Competition and Cooperation in Outer Space,” <http://www.chinausfocus.com/foreign-policy/sino-us-competition-and-cooperation-in-outer-space/> // MH)

Unfortunately, there is competition between China and the U.S. in outer space at the legal, military and diplomatic levels. At the legal level, negotiation and bargaining on the establishment of an international code of conduct to govern behavior in space is now the focus of Sino-U.S. competition. In February 2008, China and Russia proposed a draft “Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects” (PPWT). The EU has also put forward three versions of a code of conduct for behavior in space. For fear of restrictions and concessions on military uses of space, the U.S. has refused to accept both the EU and the China-Russia versions. At the military level, control and the ability to counter control space will be the key to future Sino-U.S. confrontation. In the 14 versions of U.S. DoD annual reports on China’s military strength, the U.S. DoD has maintained consistent concern over the PLA’s space and counter-space capabilities. As mentioned in the Joint Publication 3-14 Space Operations released on May 29, 2013, the U.S. has decided to negate adversary space capabilities through deception, disruption, denial, degradation, or destruction, thus targeting an adversary’s space-related capabilities and forces by use of both lethal and nonlethal means. At the diplomatic level, winning international support is the hot point of Sino-U.S. competition. Due to U.S. obstruction, China now can only have limited international exchanges and cooperation on space technologies and activities. Nevertheless, both China and the U.S. can gain benefits from space cooperation. For example, joint promotion of establishing a fair and reasonable space code of conduct can guarantee the peaceful, stable and sustainable development of outer space. Both countries should join hands to deal with common threats such as space debris. Furthermore, against the background of a U.S. rebalance toward the Asia-Pacific region, space cooperation can help reduce suspicion, increase trust, and maintain strategic stability between the two countries. Possible areas for Sino-U.S. space cooperation may include an invitation by the U.S. for China to join efforts in international space exploration (as suggested by the NRC report), the sharing of space situation awareness (SSA) information, relief of a space technology blockade against China, establishing crisis management mechanisms to guard against miscalculations, as well as the beginning of bilateral and multilateral dialogues on sensitive issues such as space weaponization.

#### Space debris causes miscalculation and escalates to nuclear war

**Tyson 7** — Program Officer of the Global Security Institute (Rhianna, “Advancing a Cooperative Security Regime in Outer Space”, Global Security Institute, May 2007, [http://www.gsinstitute.org/gsi/pubs/05\_07\_space\_brief.pdf)](http://www.gsinstitute.org/gsi/pubs/05_07_space_brief.pdf)" \t "_blank)

Threats to space assets grow with our ever-increasing uses of outer space. At present, there are over 800 commercially used satellites in orbit.2 Orbital paths are further cluttered by deserted spacecraft, discarded rocket debris and other “space junk” shed from hardware. A piece of space debris, with an average impact speed of 36,000 kilometers per hour,3 could destroy a satellite. While a collision of two operating satellites is predictable (yet nonetheless worrisome), the overcrowding of orbital paths heightens the risk of radio frequency interference, causing harmful disruptions in communication. Beyond the severe economic repercussions resulting from disrupted commercial satellite communications, hostile actions in space can result in grave security threats, especially in times of war. Militaries rely on satellites for monitoring of and communication with troops on the ground. If a military satellite was deceived, disrupted, denied, degraded or destroyed, commanders lose their communication capabilities, resulting in mounting tensions and an escalation of conflict. A worst-case scenario could involve inadvertent use of nuclear weapons; without satellite-enabled monitoring capability in a time of tension, or, if early warning systems give a false reading of an attack, governments may resort to using nuclear weapons.

#### Anti-satellite attacks inevitable without cooperation—that causes nuclear retaliation and collapses power projection—testing is sufficient to trigger our impacts

Gallagher 15 “Antisatellite warfare without nuclear risk: A mirage,” Nancy, interim director of the Center for International and Security Studies in Maryland, previous Executive Director of the Clinton Administration’s CTBT Treaty Committee, an arms control specialist at the State Dept., and a faculty member at Wesleyan, May 29, 2015, Bulletin of Atomic Scientists, <http://thebulletin.org/space-weapons-and-risk-nuclear-exchanges8346> \*modified

In recent decades, however, as space-based reconnaissance, communication, and targeting capabilities have become integral elements of modern military operations, strategists and policy makers have explored whether carrying out antisatellite attacks could confer major military advantages without increasing the risk of nuclear war. In theory, the answer might be yes. In practice, it is almost certainly no. Hyping threats. No country has ever deliberately and destructively attacked a satellite belonging to another country (though nations have sometimes interfered with satellites' radio transmissions). But the United States, Russia, and China have all tested advanced kinetic antisatellite weapons, and the United States has demonstrated that it can modify a missile-defense interceptor for use in antisatellite mode. Any nation that can launch nuclear weapons on medium-range ballistic missiles has the latent capability to attack satellites in low Earth orbit. Because the United States depends heavily on space for its terrestrial military superiority, some US strategists have predicted that potential adversaries will try to neutralize US advantages by attacking satellites. They have also recommended that the US military do everything it can to protect its own space assets while maintaining a capability to disable or destroy satellites that adversaries use for intelligence, communication, navigation, or targeting. Analysis of this sort often exaggerates both potential adversaries’ ability to destroy US space assets and the military advantages that either side would gain from antisatellite attacks. Nonetheless, some observers are once again advancing worst-case scenarios to support arguments for offensive counterspace capabilities. In some other countries, interest in space warfare may be increasing because of these arguments. If any nation, for whatever reason, launched an attack on a second nation's satellites, nuclear retaliation against terrestrial targets would be [the] an irrational response. But powerful countries do sometimes respond irrationally when attacked. Moreover, disproportionate retaliation following a deliberate antisatellite attack is not the only way in which antisatellite weapons could contribute to nuclear war. It is not even the likeliest way. As was clearly understood by the countries that negotiated the Outer Space Treaty, crisis management would become more difficult, and the risk of inadvertent deterrence failure would increase, if satellites used for reconnaissance and communication were disabled or destroyed. But even if the norm against attacking another country’s satellites is never broken, developing and testing antisatellite weapons still increase the risk of nuclear war. If, for instance, US military leaders became seriously concerned that China or Russia were preparing an antisatellite attack, pressure could build for a pre-emptive attack against Chinese or Russian strategic forces. Should a satellite be struck by a piece of space debris during a crisis or a low-level terrestrial conflict, leaders might mistakenly assume that a space war had begun and retaliate before they knew what had actually happened. Such scenarios may seem improbable, but they are no more implausible than the scenarios that are used to justify the development and use of antisatellite weapons.

## 1NC

### 1NC – Espionage DA

#### Current ban on Sino-American space research prevents espionage

Dickerson ’15 (Kelly Dickerson was a science reporter for Tech Insider, covering space and physics news. “Here's why NASA won't work with China to explore space,” Tech Insider, 19 Oct 2015, http://www.techinsider.io/nasa-china-collaboration-illegal-2015-10 – SY)

The reason is because, in 2011, Congress passed a spending bill that expressly forbids NASA from working with China, citing a high risk of espionage.¶ What's more, it doesn't sound like the attitudes of US lawmakers toward the People's Republic of China are changing anytime soon.¶ A 2015 report from the University of California called "China Dream, Space Dream" concludes that: "China's efforts to use its space program to transform itself into a military, economic, and technological power may come at the expense of U.S. leadership and has serious implications for U.S. interests."¶ It will take a big policy shift to change that sentiment and foster collaboration between NASA and the China National Space Administration (CNSA).¶ One of the biggest collaborative projects in which NASA is involved is the International Space Station (ISS). It's a space station built and maintained by the United States, Russia, Europe, Japan, and Canada.¶ China, however, is banned from involvement in the ISS, thanks to US lawmakers.¶ But CNSA seems to be doing just fine on its own. Since its founding in 1993, the Chinese space agency has launched 10 people and a small space station into orbit, among other missions.

#### China is lagging behind the US in space power – espionage allows it to get ahead and kill US hegemony

Pollpeter et al 15 [Kevin Pollpeter¶ Eric Anderson¶ Jordan Wilson¶ Fan Yang; A report prepared for theU.S.-China Economic and Security Review Commission; Monday, March 2, 2015; China Dream, Space Dream¶ China’s Progress in Space Technologies¶ and Implications for the United States; http://origin.www.uscc.gov/sites/default/files/Research/China%20Dream%20Space%20Dream\_Report.pdf//TPB]

China’s position in the world has been evolving. It seeks increased influence and independence from¶ foreign powers with the ultimate goal of preserving China’s sovereignty, independence, territorial¶ integrity, and political system. Over the long term, China seeks to transform the international system to¶ better suit its interests, but seeks to integrate itself into the existing international system over the short¶ term with the goal of reshaping the Asia-Pacific political environment into one in which its interests must¶ be given greater attention.¶ China’s pursuit of space power is intended to support this strategy. China views the development of space¶ power as a necessary move for a country that wants to strengthen its national power. Indeed, China’s goal¶ is to become a space power on par with the United States and to foster a space industry that is the equal¶ of those in the United States, Europe, and Russia. China takes a comprehensive, long-term approach to¶ this goal that emphasizes the accrual of the military, economic, and political benefits space can provide.¶ By placing much of its space program in a 15-year development program and providing ample funding,¶ the Chinese government provides a stable environment in which its space program can prosper. Although¶ China is probably truthful when it says that it is not in a space race, such statements mask the true intent¶ of its space program: to become militarily, diplomatically, commercially, and economically as competitive¶ as the United States is in space.¶ For China’s military, the use of space power can facilitate long-range strikes, guide munitions with¶ precision, improve connectivity, and lead to greater jointness across its armed forces. Economically, space¶ technologies can create markets for new technologies and result in “spin-off” technologies for commercial¶ uses that will make its industry more competitive. Politically, space power provides “carrots and sticks”¶ that China can use to influence the international situation. Internally, China’s rise as a space power is¶ designed to demonstrate to the Chinese people that the Chinese Communist Party is the best organization¶ to lead the country.¶ In examining China’s use of its space program to advance its national security, economic, and diplomatic¶ interests, this study finds that China has made much progress, particularly in serving its national security¶ interests, but that its goals of using space to advance its economic and diplomatic interests remain¶ underdeveloped. As a result, China is a “partial space power”; that is, a global actor that has yet to¶ translate its power into comprehensive influence.¶ This conclusion should not be unexpected, however. China is a latecomer as a serious space power.¶ China’s rapid progress in space technology, although impressive, is also the result of starting from a low¶ base and a reliance on the pioneering work of the United States and Russia. The United States remains¶ the world’s leading space power, and Chinese space technologies still lag behind the United States.¶ Nevertheless, China’s efforts to use its space program to transform itself into a military, economic, and¶ technological power may come at the expense of U.S. leadership and has serious implications for U.S.¶ interests. Even if U.S. space power continues to improve in absolute terms, China’s rapid advance in space¶ technologies will result in relative gains that challenge the U.S. position in space. At its current trajectory,¶ China’s space program, even if not the equal of the U.S. space program, will at some point be good enough¶ to adequately support modern military operations, compete commercially, and deliver political gains that¶ will serve its broader strategic interest of again being a major power more in control of its own destiny.

#### Leads to a domino effect ending in the apocalypse

Andrea E. **Varisco 13**, Ph.D. candidate at the Post-War Reconstruction and Development Unit of the University of York, holds a Master in International Affairs, Peace and Conflict Studies specialisation from the Australian National University and the International Peace Research Institute, Oslo and a Master in Politics and Comparative Institutions from the University of Milano, 6/3/13, “Towards a Multi-Polar International System: Which Prospects for Global Peace?,” <http://www.e-ir.info/2013/06/03/towards-a-multi-polar-international-system-which-prospects-for-global-peace/>

A return to multi-polarity will therefore imply more instability among great powers. But great power rivalry will not be the only source of possible instability for the future multi-polar world. The current distribution of power allows not only great powers but also middle, small powers and non-state actors to have military capabilities that could threaten the global security. In particular, the presence of nuclear weapons constitutes a further reason of concern and implies that the future world could carry not only the potential instability of multi-polarity and great powers rivalry, but also the dangers entailed in nuclear proliferation. The future multi-polar world will thus be potentially more unstable than all the other multi-polar periods history has experienced until nowadays: for the first time in history, the world could become both multi-polar and nuclear. While some scholars argue that nuclear deterrence “could reduce the war-proneness of the coming multi-polar system” (Layne, 44-45), the majority of them consider the presence of nuclear weapons as a source of instability (McNamara; Rosen; Allison). In particular, regional powers and states that are not great powers armed with nuclear capabilities could represent a cause of concern for global security. A nuclear Iran could for example attack – or be attacked – by Israel and easily involve in this war the rest of the world (Sultan; Huntley). A war between Pakistan and India, both nuclear states, could result in an Armageddon for the whole Asia. An attack from the Democratic Peoples’ Republic of Korea (DPRK) on Japan or South Korea will trigger an immediate reaction from the US and “a nuclear proliferation ‘domino effect’ in East Asia” (Huntley, 725). Terrorists armed with nuclear weapons could wreak havoc and target the heart of the most powerful countries of the world (Bunn and Wier). Iran, Pakistan, DPRK, terrorist groups will rarely be great powers or poles in a future multi-polar world. Nevertheless, the effects of their actions could easily reverberate all over the globe and represent another cause of potential instability. For the first time in history, the stability of the future world will therefore depend not only on the unpredictable effects of the rivalry among great powers, but also on the dangerous potential of middle and small powers and non-state actors armed with nuclear weapons.

### 1NC – CP

#### **Text: The United States Federal Government should ratify the draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT).**

#### **Solves space weaponization**

Jaramillo 9 (Cesar Jaramillo, graduated with a BA and an MA in political science and global governance, 12/1/09, “In Defence of the PPWT Treaty: Toward a Space Weapons Ban” Space Security, Volume 30, Issue 4, http://ploughshares.ca/pl\_publications/in-defence-of-the-ppwt-treaty-toward-a-space-weapons-ban/, JSO)

The existing legal regime that tackles the potential weaponization of outer space is outdated, inadequate, and insufficient. Moreover, the rapidity with which space-related technologies are being developed seems to be widening the gap between military applications that may affect space assets and the precarious normative architecture that should regulate them. The fact that space will inevitably become more complex and congested each year underscores the need for a comprehensive space security treaty that builds on what little international law exists in this realm and not only reflects current threats to space security, but also tackles the emerging legal questions that inevitably arise as space becomes a more convoluted domain.

The PPWT—while not perfect and subject to revisions—represents what is undoubtedly the most substantive effort thus far to embed the oft-expressed desire to maintain a weapons-free outer space in international treaty law. It is true that the 1967 Outer Space Treaty specifically bans signatory states from placing nuclear weapons and other weapons of mass destruction in orbit and calls for the peaceful exploration of outer space. However, it does not explicitly refer to the placement or use of other types of weapons in outer space or the use of earth-based weapons against space targets—activities which clearly need regulation, if not outright prohibition.

It is often said that the perils inherent to the indiscriminate weaponization of space are perhaps only comparable to those posed by nuclear weapons, although much of this assessment rests on speculation, since outer space has not yet seen a scenario of direct military confrontation. Indeed, it is assumed that there have been no weapons placed in space to date as there have been neither claims nor denunciations of such behaviour by any state, and considerable efforts are being made in diverse governmental and nongovernmental circles to ensure that this delicate threshold is preserved. To be sure, a distinction must be made between militarization and weaponization: while the former has arguably already happened, given the widespread use of satellites for military applications such as reconnaissance and intelligence, it is the latter that is the primary focus of proponents of a space security treaty.

### 1NC – Multilateralism

#### No space race – status quo multilateral space cooperation is sufficiently peaceful

Melton 5/6 (Marissa Melton, International Broadcaster at Voice of America, 5/6/16, “No More Space Race for US, Rivalry Gives Way to Collaboration,” MH[http://www.voanews.com/content/no-more-space-race-for-us-rivalry-gives-way-to-collaboration/3318781.html //](http://www.voanews.com/content/no-more-space-race-for-us-rivalry-gives-way-to-collaboration/3318781.html%20//) )

In the four decades between Shepard's last spaceflight, much has changed between the United States and its onetime rival in space. With the 1998 launch of the International Space Station, pushing further into space has become a collaborative effort, including not just the United States and Russia, but also the European Union, China, and Japan. Over the years, at least 222 spaceflight technicians from 18 countries have worked together on long-term projects as they orbit the Earth every 90 minutes. In March of this year, U.S. Astronaut Scott Kelly returned from a one-year assignment in orbit on the space station as NASA scientists monitored the effects of long-term space travel on the human body. During that time his identical twin, former Astronaut Mark Kelly, acted as a control subject on Earth. NASA plans to monitor both men for the next year as it prepares for a new era of space exploration -- one in which private industry plays a role.

#### Russia-China alliance prevents true cooperation with the US

Palmer 6/26 (Coburn Palmer, Reporter at The Inquisitr News, 6/26/16, “Russia and China Sign Space Alliance to Threaten US Supremacy, Target Military Satellites,” <http://www.inquisitr.com/3247550/russia-and-china-sign-space-alliance-to-threaten-u-s-supremacy-targets-military-satellites/> // MH)

Russia and China signed a space alliance this week to protect their interstellar interests as the Roscosmos space agency threatened to publicly disclose the location of U.S. military satellites. Russia desperately wants to partner with NASA and prevent the militarization of space, but Russia has been rebuffed by the American space agency, so in retribution they’ve threatened to publicize the location of U.S. military satellites, reports SpaceDaily. “The US wants to preserve its monopoly in regulating space traffic. Moreover, the US military doesn’t want make data on its objects public.” The upcoming Russian catalog of near-Earth objects would include a number of asteroids and space debris, but also the location of secret U.S. military satellites. The Pentagon published the location of Russian military satellites a long time ago, but it keeps information on its own space-going vessels and those of its allies a secret. This political stance helped push China and Russia into a space alliance designed to protect their interstellar rights, promote cooperation in peaceful space exploration, and further the development of interstellar vehicles, according to Sputnik News. “The Russian and Chinese governments have signed an agreement on measures to protect technologies in connection to cooperation on peaceful space exploration and usage as well as creation and exploitation of launch vehicles and land-based space infrastructure.” Russia is attempting to expand its influence with the international community in space affairs and originally intended its catalog of near-Earth objects to be part of a UN database. The Union of Concerned Scientists estimates there are some 1,380 satellites and 500,000 pieces of space junk orbiting Earth, and Russia insists its comprehensive catalogue would increase safety, according to the DailyMail. “The Russian Federation proceeds to establish a national information service, whose function shall be to provide open access to the results of monitoring objects and events in outer space.” Retired U.S. Defense Department analyst Franklin Spinney said America should welcome cooperation with Russia in space affairs, according to Sputnik News. “My gut reaction is that the Russian move should (but probably will not) be viewed as a constructive move.” Russia’s intention to publicize the location of U.S. military satellites is also in line with the Open Skies Treaty signed in 1992 that includes 34 other countries and was designed to regulate unarmed aerial surveillance flights. It would be similar to the list maintained by the North American Aerospace Defense Command (NORAD). China, Russia and many other countries already know the location of U.S. military satellites so the only people left in the dark are everyday citizens of the Earth who may be unaware of the extent of America’s surveillance capability, reports Sputnik News. “The real threat…would be that the American people should be amazed by the shear scope of our presence, compared to that of the Russians and Chinese.” One thing is sure, the space race is heating up as countries around the world compete to see who will be the first to colonize the moon, mine nearby asteroids, and establish a Mars colony. Russia is developing a space taxi it intends to park at the International Space Station to help ferry astronauts to the lunar surface in preparation for a moon colony. Meanwhile, China is continuing with plans to launch its own space station, build a Hubble Telescope, establish a lunar colony, and send a robotic mission to Mars. Both countries lag far behind the U.S., which intends to launch a NASA-organized mission to Mars in 2030. In addition private American space transport companies have made huge strides in developing space faring vehicles. It is, in fact, these private developments that has helped fuel Russian anger. The country is outraged the U.S. has allowed private companies to do whatever they want in space. What do you think? Do you welcome Russia’s publication of U.S. military satellite locations?

#### Cooperation with China is not enough—cheating makes eventual militarization inevitable without legal enforcement mechanisms

#### No space weaponization or war – too expensive and not enough tech

Wordsworth 15 (Rich Wordsworth, writer for Gizmodo, 12/18/15, “Why We'll Never Fight a Real-Life Star Wars Space Conflict,” <http://www.gizmodo.co.uk/2015/12/why-well-never-fight-a-real-life-star-wars-space-conflict/> // MH)

Well, never say never. You might not make to the end of this paragraph before the sky lights up and the world goes dark. But there are some good reasons to be optimistic that won’t happen. One reassuring factor is that the more other countries develop their militaries, the more dependent on networks they become as well. China is developing its own drone programme, and so is Russia, which will both presumably be dependent on satellites to operate. And the more their (and our) economies and business interests develop, the more everyone will rely on satellites to further their economic ambitions. In the event that countries were to start knocking out each other’s satellites on a large scale, the consequences across the board – for everyone – would be disastrous. It would also be expensive in the short term. Getting things into orbit – peaceful or otherwise – still isn’t cheap, which is why only a handful of countries regularly do so. And if you want to blow up a network of many satellites today (as you would have to in a first strike, to ensure other satellites couldn’t pick up the slack), launching small satellites or missiles into orbit is the only practical way to do that – arming satellites with their own weaponry just isn’t financially or technologically feasible on a grand scale. We are, happily, a long way from a Death Star. “I don’t think [a large first strike] would be financially too costly [if you’re] thinking about kinetic energy weapons and the air-based or ground-based lasers,” says Jasani. “It’s viable. But if you say, ‘I’m going to put an [ASAT] weapon [permanently] in orbit’, we are then getting into very expensive and very complicated technology. So my guess is that in the foreseeable future, what we are going to focus on are the kinetic energy weapons and possibly lasers that could blind satellites or affect, for example, the solar panels. That kind of technology will be delivered in the foreseeable future, rather than having lasers in orbit [like] the Star Wars kind of thing.” But there’s another, possibly even more persuasive reason that a kinetic war in space may not happen: it’s just so much easier – and less damaging – to mess with satellites without getting close to them. “Jamming from the ground is not difficult,” says Quintana. “If you look at the Middle East, pick a country where there’s a crisis and the chances are that the military in that country has tried to jam a commercial satellite to try and avoid satellite TV channels broadcasting anti-government messages.” “My guess is that by the time we are ready for space warfare, I think you may not be banking on your hit-to-kill ASATs, but more on [non-destructive] high-energy laser-based systems,” Jasani agrees. “[Space debris] affects all sides, not just the attacked side. The attacking side will have its own satellites in orbit, which might be affected by the debris [of its own attack].” And if you really need to remove an enemy’s satellite coverage, you can always try to flatten or hack the control stations on the ground, leaving the satellites talking with no-one to listen. “I don’t think physically blowing things up from the ground is something that people are looking at again,” says Quintana. “Countries and governments try to find means other than physical conflict to achieve their strategic ends. So as space becomes more commercial and more civilian and as more scientific satellites go up, then you’ll find that states will not seek to directly attack each other, but will seek other means. “It may just be that they will try to cyber-attack the satellites and take them over, which has been done in the past. It’s much easier to physically or cyber-attack the ground control station than it is to attack the satellite itself - so why would you not look to do that as a first port of call and achieve the same ends?” Ultimately, then, what might keep us safe from a war in space isn't the horror of explosives in orbit, but a question of cost and convenience.

#### 2007 Chinese ASAT testing disproves the impact—safeguards check escalation—countries are rational and talk to each other before attacking

#### New technology solves space debris in the SQ

Kramer 13 (Miriam Kramer, staff writer for space.com, 9/30/13, “Incredible Technology: How to Clean Up Dangerous Space Junk,” [http://www.space.com/22969-space-junk-clean-up-ideas-incredible-technology.html //](http://www.space.com/22969-space-junk-clean-up-ideas-incredible-technology.html%20//) MH)

Humanity is generating space junk more quickly than the debris can fall back toward Earth naturally, putting satellites and spacecraft at risk of colliding with speeding pieces of debris. Unless something is done, the problem could get worse, said Donald Kessler, retired head of NASA's Orbital Debris Program Office. "In the long term, everything will eventually break up due to collisions," Kessler told SPACE.com. "Even if you don't add anything else to the environment, the collision frequency due to random collisions will create more debris than will re-enter naturally." [How Space Junk Threatens Future of Spaceflight (Infographic )] At the moment, NASA officials estimate that about 500,000 pieces of debris larger than a marble orbit the planet. There are 22,000 bits of junk as big as a softball, and there could be more than 100 million tiny fragments at least 1 millimeter across racing around Earth. But how can mission controllers on the ground remove those troublesome pieces of space junk — including defunct satellites, spent rocket stages and other pieces of manmade debris — from their dangerous orbits? The "old-fashioned" method Technology readily available today could mitigate the space junk threat, Kessler said. By taking only five satellites out of orbit each year for the next 100 years, while adhering to an international understanding called the 25-year rule, space agencies could stabilize the orbital environment, according to a NASA study. The 25-year rule stipulates that nations should not launch objects whose lifetime in space will exceed 25 years after the completion of their missions. Space agencies could also rely on a somewhat basic method to remove the debris, Kessler said. Engineers would need to develop some kind of technology to grapple the target piece of debris and pull it into a part of space where it could quickly to burn up in Earth's atmosphere. "Technologically speaking, the easiest way to do it is what I've been referring to as the old-fashioned way," Kessler said. "You just design a spacecraft to go up and get it, attach a rocket to it and send it on its way or wherever you want to put it." On the horizon There are other, more high-tech options on the horizon for space cleanup as well. The Defense Advanced Research Projects Agency's (DARPA) Phoenix spacecraft project would use old, but functioning pieces of defunct satellites to create new space-based systems — instead of adding completely new satellites. Officials working with the program would launch a "tender" vehicle that would make use of small "satlets" launched without an expensive antenna needed to make satellites function. Once in space, the tender would move a relatively inexpensive satlet to a defunct geosynchronous satellite. There, the old satellite's antenna could be recycled and incorporated into the tiny satellite, effectively creating a new communications system without necessarily producing more space junk. Scientists could also use lasers to mitigate the risks posed by orbital debris. "There are two ways that a laser works" to get rid of a piece of space debris, Kessler said. "One is using what they call photon power — just letting light waves slow it down until it re-enters [Earth's atmosphere], but that works really well on small stuff. "To get a big force out of it, you need to vaporize part of the surface and essentially form a jet … but when you're doing that, you don't know what might happen, so there's some uncertainty there," Kessler added. "You would hate to cause it to blow up for example." [Photos: Space Debris Images & Clean Up] Space junk-targeting lasers probably won't be built anytime soon, however, because the national security implications of such a tool could make it a non-starter, Kessler said. That is, the possibility of weaponizing a powerful space or ground-based laser could make building such a device politically difficult. Another mission — expected to launch to space in 2015 or 2016 — will aim to rendezvous with and grapple obsolete satellites. CleanSpace One, a project of the Swiss Space Center, is designed to be the first satellite capable of grappling a piece of space junk in orbit and plunging with it into Earth's atmosphere, disintegrating both spacecraft.

#### Space debris inevitable — national research council concludes.

Washington Post 11 — Washington Post, 2011 ("Report says space debris past ‘tipping point,’ NASA needs to step up action," September 1st, Available Online at https://www.washingtonpost.com/national/health-science/reports-says-space-debris-past-tipping-point-nasa-needs-to-step-up-action/2011/08/31/gIQAo6WTuJ\_story.html, Accessed 7-15-2016)

Space debris has passed the “tipping point,” according to a report released Thursday by the National Research Council, which called on NASA to find ways to better monitor and clean up the orbiting junk threatening active satellites and manned spacecraft.

“We’re going to have a lot more [debris] collisions, and at an increasingly frequent rate,” said Don Kessler, a former NASA scientist who chaired the committee that prepared the report. The orbiting objects include ejected rockets and broken satellites.

Kessler first predicted in 1978 that the number and size of objects in Earth’s orbit would become so large that they would continually collide with one another and create even more debris — a chain reaction known as a “collision cascade.”

Recent data underscore the growing problem. Two collisions since January 2007 helped at least double the number of trackable debris fragments that are in Earth’s orbit, according to the NRC report

#### ASAT use doesn’t cause nuclear war – no first use policy

Wu 15 (Wu Chunsi, director of the Institute of International Strategic Studies at the Shanghai Institutes for International Studies, 5/28/15, “The antisatellite smoke screen,” [http://thebulletin.org/space-weapons-and-risk-nuclear-exchanges8346 //](http://thebulletin.org/space-weapons-and-risk-nuclear-exchanges8346%20//) MH)

Is it correct to argue that antisatellite weapons increase the risk of nuclear war? No. No nation would launch a nuclear attack because an adversary possessed antisatellite weapons. Rather, it would launch an attack because an adversary evidently intended to stage a massive, strategic attack of its own. In the early stages of a nuclear attack, of course, antisatellite weapons might be used to destroy the other side's systems for command, control, communications, and intelligence. Even so, antisatellite weapons would be tools in a nuclear exchange—not the "reason" for the exchange. (The same is true of nuclear weapons themselves.) The most that can be said about antisatellite weapons and the risk of nuclear war is that, in a crisis, these weapons could complicate the calculations of nuclear weapon states, or figure into a nation's decision to take preemptive nuclear action. But again, antisatellite weapons would not be the "reason" for preemptive action. For nuclear weapon states that maintain a no-first-use policy—including China—antisatellite weapons could not, by definition, provoke a nuclear attack. If antisatellite weapons were actually used in a crisis, but all countries involved were committed to a no-first-use policy, conflict could still be contained within the conventional arena, without escalation to nuclear war. Nuclear risk increases only if states that contemplate the first use of nuclear weapons are involved. Therefore, what is really dangerous in a crisis is a policy that allows the first use of nuclear weapons—not the existence (or non-existence) of antisatellite weapons. Furthermore, antisatellite weapons are not even a key element in countries' decisions to adopt policies allowing the first use of nuclear weapons. My point may be clearer if I express it this way: In a world without antisatellite weapons, could all nuclear weapon states be expected to adopt no-first-use policies? The probable answer is no. Whether a nuclear weapon state takes preemptive action in a crisis is determined by the country’s political willingness to use nuclear weapons and its overall military doctrine—not by antisatellite weapons. Thus, to focus on antisatellite weapons is to misunderstand the fundamental problem endangering the world in the nuclear age.

### 1NC – Colonization

#### Space colonization is impossible – laundry list of biologic problems

Piersma 10 (November 10, 2010; Theunis Piersma is a Dutch professor of Global Flyway Ecology at the University of Groningen; “Why space is the impossible frontier”; <https://www.newscientist.com/article/mg20827860-100-why-space-is-the-impossible-frontier/>) //JM

AT A news conference before his first experience of weightlessness in 2007, theoretical physicist Stephen Hawking said that he hoped his zero-gravity flight would encourage public interest in space exploration. He argued that with an ever-increasing risk of wiping ourselves out on Earth, humans would need to colonise space. Hawking has since argued that we must do this within two centuries or else face extinction. He was no doubt encouraged by US President Barack Obama’s announcement in April this year of a new initiative to send people to Mars by 2030. Hawking, Obama and other proponents of long-term space travel are making a grave error. Humans cannot leave Earth for the several years that it takes to travel to Mars and back, for the simple reason that our biology is intimately connected to Earth. To function properly, we need gravity. Without it, the environment is less demanding on the human body in several ways, and this shows upon the return to Earth. Remember the sight of weakened astronauts emerging after the Apollo missions? That is as nothing compared with what would happen to astronauts returning from Mars. One of the first things to be affected is the heart, which shrinks by as much as a quarter after just one week in orbit (The New England Journal of Medicine, vol 358, p 1370). Heart atrophy leads to decreases in blood pressure and the amount of blood pushed out by the heart. In this way heart atrophy leads to reduced exercise capacity. Astronauts returning to Earth after several months in the International Space Station experience dizziness and blackouts because blood does not reach their brains in sufficient quantities. Six weeks in bed leads to about as much atrophy of the heart as one week in space, suggesting that the atrophy is caused by both weightlessness and the concomitant reduction in exercise. Other muscle tissue suffers too. The effects of weightlessness on the muscles of the limbs are easy to verify experimentally. Because they bear the body’s weight, the “anti-gravity” muscles of the thighs and calves degenerate significantly when they are made redundant during space flight. Despite the best attempts to give replacement exercise to crew members on the International Space Station, after six months they had still lost 13 per cent of their calf muscle volume and 32 per cent of the maximum power that their leg muscles could deliver (Journal of Applied Physiology, vol 106, p 1159). Various metabolic changes also occur, including a decreased capacity for fat oxidation, which can lead to the build-up of fat in atrophied muscle. Space travellers also suffer deterioration of immune function both during and after their missions (Aviation, Space, and Environmental Medicine, vol 79, p 835). Arguably the most fearsome effect on bodies is bone loss (The Lancet, vol 355, p 1569). Although the hardness and strength of bone, and the relative ease with which it fossilises, give it an appearance of permanence, bone is actually a living and remarkably flexible tissue. In the late 19th century, the German anatomist Julius Wolff discovered that bones adjust to the loads that they are placed under. A decrease in load leads to the loss of bone material, while an increase leads to thicker bone. It is no surprise, then, that in the microgravity of space bones demineralise, especially those which normally bear the greatest load. Cosmonauts who spent half a year in space lost up to a quarter of the material in their shin bones, despite intensive exercise (The Lancet, vol 355, p 1607). Although experiments on chicken embryos on the International Space Station have established that bone formation does continue in microgravity, formation rates are overtaken by bone loss. What is of greatest concern here is that, unlike muscle loss which levels off with time, bone loss seems to continue at a steady rate of 1 to 2 per cent for every month of weightlessness. During a three-year mission to Mars, space travellers could lose around 50 per cent of their bone material, which would make it extremely difficult to return to Earth and its gravitational forces. Bone loss during space travel certainly brings home the maxim “use it or lose it”. “Losing 50 per cent of bone material would make it extremely difficult to return to Earth’s gravity” Bone loss is not permanent. Within six months of their return to Earth, those cosmonauts who spent half a year in space did show partial recovery of bone mass. However, even after a year of recovery, men who had been experimentally exposed to three months of total bed rest had not fully regained all the lost bone, though their calf muscles had recovered much earlier (Bone, vol 44, p 214). Space agencies will have to become very creative in addressing the issue of bone loss during flights to Mars. There are concepts in development for spacecraft with artificial gravity, but nobody even knows what gravitational force is needed to avoid the problems. So far, boneless creatures such as jellyfish are much more likely than people to be able to return safely to Earth after multi-year space trips. For humans, gravity is a Mars bar. The impossibility of an escape to space is just one of many examples of how our bodies, and those of our fellow organisms, are inseparable from the environments in which we live. In our futuristic ambitions we should not forget that our minds and bodies are connected to Earth as by an umbilical cord.

#### Timeframe of this advantage makes it irrelevant—even if we can colonize it won’t happen for decades

#### Colonizing space is financially impossible

Foust 6/2 (Joshua Foust, National Security Fellow at the Foreign Policy Research Institute, 6/2/16, “Space Colonies Are Cool. And Economically Impossible.,” <http://joshuafoust.com/space-colonies-are-cool-and-economically-impossible/> // MH)

There is a hint of this economic imperative in Bezos’ call for industrializing space. He has a vision of moving all “heavy” industry into space, and rezoning the entire planet as residential and light industrial use. How one would build, say, automobiles or a heavy crane in space and then hurl it to the ground in one piece is not really clear; Bezos’ vision seems limited to generating electricity and building computer chips. There is a certain Sim City aspect to this idea, and for good reason: the city building game not only shares these broad assumptions about “zones” but it rests on fundamentally libertarian assumptions about how communities actually function: there are no ghettoes, no races, no clubs or sports lobbies, and there are no politics apart from the tax base and generating a profit. In other words: it is an ideal case for how a libertarian tech mogul would think about the world. That is not, however, the way the world works. For starters, the economic case for colonizing space is far from settled: mining raw materials on Earth is cheap, and launching equipment into space, to then wait years or decades for raw materials in the form of asteroids to be brought close enough to Earth to be usable in a factory, remains horrifyingly expensive. This may not be the case forever, but even with SpaceX’s most optimistic projections (Bezos’ own firm cannot reach orbit, so he has nothing yet to compete with Elon Musk’s company), the cost of launching heavy mining equipment into space is going to be an appalling cost (the most optimistic projects are around $500 per pound for Low Earth Orbit). There is zero competitive advantage to launching mining equipment with such exorbitant capital costs. But what of Bezos’ plan for orbiting solar power installations? The idea has some appeal, but USCD physics professor Tom Murphy looked at the issue and saw serious issues. The relatively inexpensive-to-reach Low Earth Orbit is completely impractical for a solar power array, leaving only geosynchronous orbit as a viable option. But launching things to GEO is heinously expensive — SpaceX can get something there for around $8,000 per pound. And these arrays need to be big: the transmitting dish would need to be a thousand feet across in space, and the receiving dish more than half a kilometer wide on the ground. This is to say nothing of the extreme energy losses in transmission, and other factors. As Dr. Murphy puts it: “I find myself scratching my head as to why we should go to so much trouble.” The reality is one Bezos seems reluctant to admit. “We want the population to keep growing on this planet,” he told his audience. “We want to keep using more energy per capita.” He described a harsh “retrograde world,” whereby humans need to reduce their energy consumption and stem population growth, and claimed it sounded horrific. But this is the world we live in today: rising incomes are tightly correlated (pdf) with reduced birthrates, and the last decade of experience in the U.S. has shown that economic growth is not dependent on a steady increase in per-capita energy consumption. So why would Bezos want an inefficient, crowded planet where people don’t really work except in space? I’m not prepared to speculate about that, though I suspect the “coolness” of such a world is its primary appeal. But being cool is expensive: a Mars colony will cost a tremendous amount of money to found and operate; and it is unclear how such a colony could ever become economically viable or maintain an infinite case for its corporate overlords to take a longterm financial loss (and don’t forget its government). Similarly, big floating colonies in space sound cool, but in reality are just as ridiculously ineffecient and expensive as a Martian colony. Maybe, in time — Bezos threw out an estimate of “hundreds of years” — these ideas will become economically viable. At some point, digging metal out of the ground will become more expensive than sending a bunch of manufactories to an asteroid, but that point is a very long ways off. Maybe someone can concoct a viable economic case for building vulnerable, marginal habitats on Mars, but that remains far into the future. But I worry about the excitement over cool billionaires doing cool things that won’t last. There is a strong scientific imperative to exploring, discovering, and understanding the wonders of our solar system. And there is a solid case for sending exploration teams (along with robots!) into the dark so that they can learn about our universe. But permanent colonies are a really hard sell. When Europeans set out for the New World, their lust for wealth wound up destroying the natural world around them, the cultures that lived there, and millions of lives. It came at a horrendous cost, in other words. And that cost is something the current titans of commercial space colonization seem completely unable to discuss.

#### Chinese cooperation is necessary but not sufficient to solve—their evidence only says it’s a barrier, but not that it’s the only one

#### China isn’t key – NASA will be able to go to space by itself again when it finishes the SLS

NASA 7-7 — NASA, ("Space Launch System (SLS) Overview", 7-7-2016, Available Online at https://www.nasa.gov/exploration/systems/sls/overview.html, accessed 7-15-2016, JSO)

Space Launch System (SLS) Overview

NASA’s Space Launch System, or SLS, is an advanced launch vehicle for a new era of exploration beyond Earth’s orbit into deep space. SLS, the world’s most powerful rocket, will launch astronauts in the agency’s Orion spacecraft on missions to an asteroid and eventually to Mars, while opening new possibilities for other payloads including robotic scientific missions to places like Mars, Saturn and Jupiter.

Offering the highest-ever payload mass and volume capability and energy to speed missions through space, SLS is designed to be flexible and evolvable, to meet a variety of crew and cargo mission needs.

In 2015, NASA completed the critical design review – a first for a NASA exploration class vehicle in almost 40 years -- and continues to move forward with production of the launch vehicle. Engineers are making rapid progress aimed toward delivering the first SLS rocket to NASA’s Kennedy Space Center in Florida for its first launch. Flight hardware is currently in production for every element.

#### **China will say no—current talks with the EU prove they’d rather cooperate with other countries—the Wolfe Amendment has destroyed any chance for cooperation**

#### **Space colonization isn't necessary and doesn't solve extinction – their terraforming warrant is incorrect**

Williams 2010 (Lynda, Physics Professor at Santa Rosa Junior College, "Irrational Dreams of Space Colonization", Peace Review: a Journal of Social Justice, http://www.tandfonline.com/doi/abs/10.1080/10402650903539828#.V4jq8bgrLn0)

The Destruction of Earth Threat¶ According to scientific theory, the destruction of Earth is a certainty. About five billion¶ years from now, when our sun exhausts its nuclear fuel, it will expand in size and¶ envelope the inner planets, including the Earth, and burn them into oblivion. So yes, we¶ are doomed, but we have 5 billion years, plus or minus a few hundred million, to plan our¶ extraterrestrial escape. The need to colonize the Moon or Mars to guarantee our survival¶ based on this fact is not pressing. There are also real risks due to collisions with asteroids¶ and comets, though none are of immediate threat and do not necessitate extraterrestrial¶ colonization. There are many Earth-based technological strategies that can be developed¶ in time to mediate such astronomical threats such as gravitational tugboats that drag the¶ objects out of range. The solar system could also potentially be exposed to galactic¶ sources of high-energy gamma ray bursts that could fry all life on Earth, but any Moon or¶ Mars base would face a similar fate. Thus, Moon or Mars human based colonies would¶ not protect us from any of these astronomical threats in the near future.¶ The Destruction of Earth’s Biosphere¶ Life on Earth is more urgently threatened by the destruction of the biosphere and its life¶ sustaining habitat due environmental catastrophes such as climate change, ocean¶ acidification, disruption of the food chain, bio-warfare, nuclear war, nuclear winter, and¶ myriads of other man-made doomsday prophesies. If we accept these threats as¶ inevitabilities on par with real astronomical dangers and divert our natural, intellectual,¶ political and technological resources from solving these problems into escaping them,¶ will we playing into a self-fulfilling prophesy of our own planetary doom? Seeking space¶ based solutions to our Earthly problems may indeed exacerbate the planetary threats we face. This is the core of the ethical dilemma posed by space colonization: should we put¶ our recourses and bets on developing human colonies on other worlds to survive natural¶ and man-made catastrophes or should we focus all of our energies on solving the¶ problems that create these threats on Earth?¶ Human Life on The Moon and Mars¶ What do the prospects of colonies or bases on the Moon and Mars offer? Both the Moon¶ and Mars host extreme environments that are uninhabitable to humans without very¶ sophisticated technological life supporting systems beyond any that are feasible now or¶ will be available in the near future. Both bodies are subjected to deadly levels of solar¶ radiation and are void of atmospheres that could sustain oxygen-based life forms such as¶ humans. Terra-forming either body is not feasible with current technologies or within any¶ reasonable time frames so any colony or base would be restricted to living in space¶ capsules or trailer park like structures which could not support a sufficient number of¶ humans to perpetuate and sustain the species in any long term manner.